Unit 7

Regular Maintenance of Gearbox

We will now learn about another important component of a vehicle, the gearbox. It helps in maintaining the speed of the vehicle. However, to ensure smooth gear change, the clutch needs to be properly adjusted.

In this Unit, you will understand the importance of gearbox maintenance.

Session 1: Lubrication of Gearbox

To overcome resistances like gradient resistance, air resistance and load resistance, it is necessary to increase the tractive effort. We use gearbox in transmission by changing the gear ratios, which overcome the resistances. It is placed between the clutch and propeller shaft or differential. When gearbox increases efforts in transmission of power, heat is produced in meshing gears and contact surface area between meshing gear teeth comes under heavy friction.

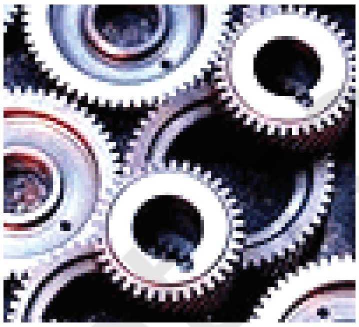

Fig. 7.1: Gear

The lubricating oil reduces friction and also provides a cushioning effect, when clutch shaft transmits the drive to the countershaft and power is transmitted to the main shaft gear. The selective mechanism locks the respective gears as per the requirement (gear ratio) and power is then transmitted through the main shaft. In this transition, selective mechanisms, gear wheel, gear shaft splines, gear teeth develop friction and heat. To sustain the life of these components, it is necessary to lubricate these parts and change the lubricating oil at specified intervals. In motorcycles, the lubricating oil needs to be changed at 2,000–3,500 km, whereas in cars it needs to be changed at 10,000–15,000 km.

Notes

Steps for Changing Lubrication of Gearbox

Given below are the steps for changing lubrication of gearbox:

- Check for leakage of oil from the gearbox and clean the air breathers.
- Check the level of lubricating oil in the gearbox by loosening the oil level bolt, which is placed at the side of gearbox.
- When the gearbox is filled with the correct quantity of oil, it starts to flow through the level hole.
- To check the quality of oil in the gearbox, the following procedure may be adopted:
  - Take a drop of used oil and place it on the nail of thumb, while the thumb is being held vertically upward. Check the viscosity of old lubricating oil (flow of oil) in the downward direction. Similarly, check the flow of new oil, on the other hand's thumbnail, and compare the resistance to flow for both. The used oil will flow faster in comparison to new oil.
  - Check the oiliness of the oil by rubbing continuously on the hand skin. The old oil will smell of used oil. The oil should not have a burnt smell.

Changing the Lubricating Oil

Follow the steps given below to change the lubricating oil:

- Run the vehicle for 2–3 km.
- Place a container below the drain plug of the gearbox.

- Open the filler and drain plug and leave it for appropriate time, for the oil to completely drain out.
- Replace the washer of drain plug and tighten it to the specified torque.
- Refill the gear oil of specified grade and quantity up to the level mark.
- Close the level or filler plug.

Practical Exercise

1. Check the viscosity and oiliness of lubricating oil in an engine of a car.

Check Your Progress

A. Fill in the blanks

1. Lubricating oil is used for____________.
2. Lubrication removes ________ from engine.
3. Replace the _________at the manufacturer recommended interval.

B. Multiple choice questions

1. In motorcycles, lubricating oil should be changed after ____________________.
   (a) 2,000–3,500 km
   (b) 4000–5000 km
   (c) 7000–8000 km
   (d) None of the above
2. In cars, the lubricating oil should be changed after ____________________.
   (a) 10,000–15,000 km
   (b) 25000–27000 km
   (c) 3000–5000 km
   (d) None of the above
3. Steps for changing lubrication of gearbox include _________________.
   (a) checking for leakage of oil from the gearbox
   (b) checking the level of lubricating oil in the gearbox by loosening the oil level
   (c) bolt when the gearbox is filled with correct quantity of oil
   (d) All of the above

4. Basic steps for changing the lubricating oil include ____ ____________________________________.
   (a) placing the container below the drain plug of gearbox
   (b) opening the filler and drain plug and leaving it for appropriate time
   (c) replacing the washer of drain plug and tightening it to the specified torque
   (d) All of the above

C. Answer the following questions

1. What is a gearbox?
2. Differentiate between oil and coolant.
3. Name the tools used for changing coolant in a vehicle.

SESSION 2: SETTING OF GEARBOX

For easy shifting of gears, it is necessary to regularly lubricate the gear linkages or it may cause hard gear shifting and slipping of gear out of the mesh. To avoid this problem, it is necessary to inspect the alignment of the following parts:

- Gear lever with gear rod: excessive play is adjusted by adding thrust washers in gear lever casing. Also, the gear rod spring and lever boll should be checked for wear.
- Gear shifter fork should be aligned with shifting sleeve on the mainshaft of the respective gear. If the alignment is improper, loosen the fork bolt and adjust the same.
- Check the synchronising ring with the synchronising cone and with fixed hub mounted on main shaft. Inspect the internal and gear teeth for nick formation, polish it to solve the problem. In case of motorcycles, tighten the gear shifter lever, if it has slackened.

Go for road test after servicing and check the following:

- Gears shift easily from 1 to 5 and reverse, with appropriate speed and resistance.
- Power transmission should be smooth.

Fig. 7.3: Gear Shifter Fork

Practical Exercise

1. Identify and list the gear selective mechanism of a car.

Check Your Progress

A. Fill in the blanks

1. More play in gear linkage causes _____________.
2. When gearbox increases ____________ in transmission of power, heat is produced in meshing gears.
3. In a two-wheeler, the lubricating oil should be changed at every ______ km.
4. Check the level of lubricating oil in the _______ by loosening the oil level bolt.

B. Multiple choice questions

1. Which of these is not a component of the gearbox?
   (a) Gear linkage
   (b) Gear lever
   (c) Gear shifter lock
   (d) Piston
2. What should align with shifting sleeve on the main shaft?
   (a) Gear
   (b) Gear shifter fork
   (c) Gear linkage
   (d) Gear lever
3. For easy shifting of gears, it is necessary to regularly lubricate the _________________.
   (a) thrust washer
   (b) gear linkages
   (c) spanner
   (d) bolt

C. Answer the following questions

1. What is the function of a gearbox?
2. What are the different combinations in gearbox?